

Washington Park Arboretum

BULLETIN

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— Washington Park Arboretum —

The Arboretum is a 230-acre dynamic garden of trees and shrubs, displaying internationally renowned collections of oaks, conifers, camellias, Japanese and other maples, hollies and a profusion of woody plants from the Pacific Northwest and around the world. Aesthetic enjoyment gracefully co-exists with science in this spectacular urban green space on the shores of Lake Washington. Visitors come to learn, explore, relax or reflect in Seattle's largest public garden.

The Washington Park Arboretum is managed cooperatively by the University of Washington Botanic Gardens and Seattle Parks and Recreation; the Arboretum Foundation is its major support organization.

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CONTENTS

2 Generations—Paige Miller

3 Designing a Low-Maintenance Garden in the Puget Sound Region—*Janine Anderson*

7 The Fossil Forests of Eastern Washington—*Daniel Mount*

12 HIDDEN TREASURES OF THE ARBORETUM: Pleasing *Polyspora*—*Walt Bubelis*

15 The MsK Nursery: Lifelong Dream of Mareen Schultz Kruckeberg—*John A. Wott*

21 Wind-Resistant Trees—*Niall Dunne*

24 PLANT ANSWER LINE: Frost Flowers—*Rebecca Alexander*

26 IN A GARDEN LIBRARY: The Flora of Oregon and Northern California—*Brian R. Thompson*



ABOVE: A hybrid hellebore (*Helleborus* 'HGC Cinnamon Snow') blooming in the Witt Winter Garden in January. (Photo by Niall Dunne)

ON THE COVER: A female Pileated Woodpecker, photographed on Foster Island in the Arboretum last winter, by Larry Hubbell, creator of the wonderful birding blog Union Bay Watch (unionbaywatch.blogspot.com). Larry has named this bird Priscilla and her mate Elvis. You can tell the pair apart by the color of their irises: Priscilla's are red, while Elvis's are yellow. Male Pileated Woodpeckers also have a red horizontal stripe on each cheek.

"Priscilla is less outgoing than Elvis," says Larry. "In the spring, she generally spends daylight hours on eggs in their nest. So the winter is one of the best times to see her, when the leaves have dropped and she is out and about. One of their favorite foods is carpenter ants. Priscilla and Elvis often feed together in fairly close proximity. However, they cannot always see each other as they move up, down and around the trees. As a result, they often call out for reassurance. All of these factors make Priscilla easier to spot in the winter. Watching her as she feeds in the Arboretum always makes my day."

Generations

*F*or more than 80 years, generations of Seattle families have sustained the Arboretum through their volunteer efforts and their financial contributions to the Arboretum Foundation. One of my great delights as your Executive Director has been learning the stories of our early leaders and getting to know those who have carried on their legacies. Their stories are rich in history.

Donald and Juanita Graham were among our most important founders, as was Juanita's father, O. D. Fisher. Donald Graham was the driving force to create our Foundation, and Juanita was the one who started our volunteer units—modeled on the guilds at Children's Hospital. Their son, Donald Jr., at age 92 continues to support our ongoing programs, and to drive himself over to visit with me. He enchanted Foundation members at our most-recent annual meeting with his recollections of being a teenager, watching his parents work every angle necessary to secure support for the Arboretum. And, his son Frederick now serves on our finance committee, making him the fourth generation of the Fisher/Graham family to help us!

Another old Seattle family with deep ties to us is the Pigotts. Our records for Theiline Pigott show that she first volunteered for us on May 1, 1939. Several of her children have continued her commitment, as have some of her Pigott and Wyckoff grandchildren and their families.



Volunteering here often runs in families. Skip Vonckx has served on our board for more than a dozen years, works on his hands and knees in the Arboretum as a garden steward, and helps Bob Lilly each year to build our display garden at the Northwest Flower and Garden Show. His wife, Zanny, volunteers in the Gift Shop, and his daughter Hilary has joined him as a garden steward. Meg Harry followed in the footsteps of her father, Dave Hervey, as a Board Member, her husband chairs our Opening Night Party this year, and their twins are happily enrolled in the Arboretum's outdoor Fiddleheads Forest Preschool. These are just two of many, many family stories.

This year we will salute the generations of families who have supported us at our Opening Night Party on February 16. Ann Pigott Wyckoff will be our honorary chair and Chris Harry is our event chair. Each represents a family who has helped to nurture and sustain the Arboretum for decades.

The party will have a new and (I think) better format this year. Guests will first attend a reception among the display gardens at the Flower and Garden Show and afterwards enjoy a seated, plated dinner in the South Lobby of the Convention Center. This will provide a much better environment for our live auction and our program honoring those generations who came before, as well as those who are carrying on the tradition of preserving and enhancing the Arboretum for this generation and those who will follow us. Please do come to Opening Night and join us in our celebration. ~

Cheers,

Paige Miller, Executive Director,
Arboretum Foundation

Paige, with Donald Graham, Jr. outside the Graham Visitors Center.



Designing a Low-Maintenance Garden *in the Puget Sound Region*

BY JANINE ANDERSON

If you hired a landscape designer, would you ever consider asking her to create a garden that requires intensive maintenance? Probably not, unless perhaps you have an unlimited budget and can employ skilled professionals to care for it. Many clients of mine invariably express a preference for low-maintenance landscapes.

Generally, these are folks for whom a garden is a pleasure, but the act of intensive gardening

is not. However, as we read in the last issue of this magazine, a low-maintenance garden has other benefits besides reducing the level of effort required by the gardener: It can also be kinder to the environment. Low-maintenance gardens use less water, fertilizer, fuel and other resources. (See “Our Changing Climate, Part 1: Reducing Your Garden’s Climate Footprint,” “Washington Park Arboretum Bulletin,” Fall 2015.)

No thoughtfully designed landscape is maintenance free. This article offers suggestions

ABOVE: Western red cedar underplanted with mahonias and witch-hazels in the Arboretum’s Witt Winter Garden. A backbone of tough, hardy, woody plants is the key to creating a low-maintenance garden in our region. (Photo by Niall Dunne)



for keeping maintenance levels in your garden low, while keeping enjoyment levels high.

A Backbone of Hardy, Woody Plants

Some plants require more tending than others. If your goal is to reduce the time spent maintaining your garden, you should select plants that have fewer maintenance needs.

Woody plants, such as trees and shrubs, generally require less fussing than herbaceous plants, such as perennials, grasses and ferns, which often look best when cut back or divided at specific times. If these tasks are not performed or if the plants become crowded, they can lose vigor and become less attractive. Of course, many of us enjoy grasses and perennials in our gardens, but if your goal is to reduce maintenance, the backbone of your garden should comprise trees and shrubs adapted to our climate, with perennials and grasses added as accents. Once a structure is established, perennials and grasses can be added as time or interest allows. Annuals and exotic plants that are not hardy in the Pacific Northwest or that require special protection during winter also can be added sparingly to cover bare areas and add a little pizzazz to your garden beds.

Site Plants to Reduce Mess

The trees and shrubs that form the backbone of your garden can be messy. Needles, leaves, cones, flower parts and fruits can litter walkways and garden beds. In nature, this organic matter decomposes with the help of beneficial microorganisms and adds nutrients to the soil. The same process can occur in your garden, but a little more effort is required to keep the litter in the beds and away from hard surfaces and lawns. And in the spring you will probably need to remove some of the remaining debris to make way for more delicate emerging plants. Siting plants carefully will help alleviate some of these problems. Expanding the size of your planting beds, while reducing the size of your lawn and hardscape, is another way to reduce your raking and sweeping workload in the fall or spring.

Some plants are less messy than others. Rhododendrons are among the tidier shrubs. In addition to being generally suitable to the Puget Sound region, they require very little shaping, and the few leathery leaves they do shed are easy to dispose of. Their flowers are their most compelling feature, but you'll want to make sure to choose varieties with attractive leaves as well, because it's the foliage that you'll be looking at

ABOVE LEFT: The magenta pink buds of *Rhododendron 'Crete'* are followed by lovely pinkish-white flowers in April, but it is the handsome evergreen foliage of this low-maintenance plant that make it attractive year-round.

ABOVE CENTER: *Podocarpus lawrencei 'Blue Gem'* is a wonderful, low-maintenance small conifer that can be used as a groundcover.

ABOVE RIGHT: Once its golden-yellow leaves emerge in early spring, shade-loving *Hakonechloa macra 'All Gold'* is a star performer into fall. (All photos by Janine Anderson)



and admiring for 12 months of the year. *Daphne tangutica*, a small shrub with dark evergreen leaves and sweetly scented, pale-pink flowers followed by bright-red berries, provides a lot of pleasure with little effort on your part.

Avoid Weedy Varieties

Plants to avoid in a low-maintenance garden include those that send up suckers from the base, such as many viburnums. Others, such as harlequin glory bower (*Clerodendrum trichotomum*), send underground runners that are almost impossible to eradicate once they emerge smack in the middle of a treasured planting. Some plants, such as Himalayan honeysuckle (*Leycesteria formosa*) and cotoneaster, “seed around.” If the young plants are not consistently weeded out, you will end up with a garden full of their offspring. Many vines, such as wisteria and grape, are gorgeous, but they also require attention several times during the growing season to keep their vining shoots from reaching into nearby trees and power lines.

Size (Of Your Space) Matters

Many woody plants require no or only minimal shaping, especially if their size suits the site and they are spaced appropriately. Plants tend to look best if they have room to grow to their mature size and maintain their natural form. The arching stems of *Abelia ‘Edward Goucher’* reach six feet tall. If you plant it in an area measuring three-by-three feet, you will either need to shear it, thereby sacrificing form and flowers (along with the hummingbirds that are attracted

to them), or your planting will be a jumbled hodgepodge, as opposed to a striking combination in which every plant can be admired in its entirety. Other plants with arching habits similar to abelia are varieties of box honeysuckle, such as *Lonicera nitida ‘Baggesen’s Gold’*, and ninebarks, such as *Physocarpus opulifolius ‘Dart’s Gold’*. These are fine plants, but if you don’t have enough room for them, you will be unable to showcase the traits for which they were selected, and you will spend a lot of time and energy trying to make up for your mistake.

Planting in Groups

Harmonizing form, scale, texture and color by combining a variety of different plants brings depth to a landscape, but grouping multiples of the same plant also can have a dramatic effect, while simultaneously reducing maintenance requirements. A potential drawback of planting a limited variety of plants is that failure of any one type of plant can obliterate your landscape and create a maintenance headache. But planting just one of many different types of plants can create its own type of maintenance headache, in addition to requiring a larger knowledge base of how to care for so many different plants. Look to strike a nice balance between uniformity and diversity in your plantings.

Once you’ve established a backbone of woody plants, group other plants around their bases. These can be smaller woody shrubs such as *Podocarpus laurencei ‘Blue Gem’*, *Spiraea japonica ‘Magic Carpet’* and *Taxus cuspidata ‘Emerald Spreader’*, or herbaceous plants, such as grasses,

ferns and perennials. Refer to the Great Plant Picks website (www.greatplantpicks.org) for help in selecting hardy herbaceous plants and choose several from among the most reliable, such as grasses like *Carex oshimensis* ‘Evergold’ and *Hakonechloa macra* ‘All Gold’; ferns such as *Polystichum setiferum* and our native sword fern (*Polystichum munitum*); and perennials such as *Beesia deltophylla* or one of the hardy geraniums. Mat-forming groundcovers such as *Sedum spurium* ‘John Creech’ or *Waldsteinia ternata* will form the thread that ties an entire planting together, while also helping to suppress weeds.

Right Plant, Right Place

Grouping plants by their cultural needs will help reduce maintenance requirements. Grow sun-loving plants with other sun-seekers, and shade-lovers with plants that have similar preferences. Don’t site plants that need shelter from strong winds in an exposed area or plants that prefer wet feet on a parched slope.

Mulch!

Adding organic compost to your garden beds creates healthier soil, protects roots from extremes of hot and cold, retains moisture in the soil so less watering is needed, and helps with weed suppression.

Consider an Irrigation System

Watering is probably the most critical component of maintaining an attractive—or indeed living—landscape, but it is also one of the most labor intensive. A well-designed irrigation system will enable you to water more efficiently, thereby reducing water use along with the time spent watering. In the long run, it may even pay for itself.

Create a Maintenance Schedule

The underlying message of this article is that it is possible to reduce maintenance requirements in a landscape, but they cannot be eliminated entirely, at least not if living plants are involved. If you create a monthly maintenance schedule for your landscape, the few tasks you do need to



Avoid weedy plants such as cotoneaster that can take over your yard. (Photo by Niall Dunne)"

perform can be done at the right time and in the most efficient manner.

Resources and Conclusions

The Great Plant Picks website has lists of the best-performing plants for Western Washington. If you need help with a design, professional landscape designers (see the website of the Washington Chapter of the Association of Landscape Designers, <http://apldwa.org>) can help you create an alluring, yet not enslaving, landscape. The City of Seattle’s Saving Water Partnership website (www.savingwater.org) has information on irrigation systems and a list of certified irrigation contractors.

Gardens are not static. A garden can be designed and installed and seem perfect, but it will change over time. Although no garden is maintenance free, you need not be a slave to it either. Careful plant choices and placement, efficient irrigation, compost application, and knowledge of what needs to be done and when will go a long way toward keeping maintenance levels low and enjoyment levels high! ~

This article was adapted with permission from the website of the Washington Chapter of the Association of Landscape Designers (APLD), <http://apldwa.org>. The mission of the APLD is to advance the profession of landscape design, and to promote the recognition of landscape designers as qualified and dedicated professionals.

JANINE ANDERSON, CPH, is an award-winning Pacific Northwest-based landscape designer (www.anderson-design.net), garden writer, speaker, and member of the “Bulletin” Editorial Board. She is a professional member of the APLD.

Dawn of the Modern Garden

Eastern Washington's Fossil Forests Reveal a Familiar Flora

TEXT AND PHOTOS BY DANIEL MOUNT



One hardly thinks of 50 million years ago as “modern times.” There were no cell phones, no area code 206. There wasn’t even a Western Washington, as we know it. No Puget Sound. No Olympic Peninsula. No Cascades. The Arboretum was somewhere under the waves of the Pacific, as they crashed into a huge coastal plain, lush with subtropical forests of palms and dawn redwoods. Yet

paleontologists named this epoch, between 56 and 33.9 million years ago, the Eocene—literally “the dawn of the modern”—because it was during this time that the progenitors of the plants and animals we find in our forests and gardens today first appeared.

The world was a very different place then. The continents, as we know them today, were more or less discernible and moving towards

ABOVE: A nearly 50-million-year-old fossil leaf that the author dug up in Republic, a town in the Okanogan Highlands of Washington. The leaf probably belonged to a type of serviceberry (*Amelanchier*), a member of the rose family.

their current position, but sea levels were much higher. At the Eocene Optimum, about 49 million years ago, a subtropical climate reached all the way to the Arctic Circle, and there were no polar ice caps. Due to the frequency of volcanic eruptions, the atmosphere was also very different. Greenhouse gases filled the air, creating a stable and warm climate ideal for the evolution of plants.

Much of this is evidenced in the rich, forest-fossil deposits of Western Washington. Palms and cycads, as well as more temperate species like walnuts and oaks, are well represented in the fossil record from these subtropical lowlands—which experienced a similar temperature to modern-day Los Angeles, but a great deal more rainfall. Farther inland, something different was found in the Eocene fossil beds of the plateau-like Okanogan Highlands of Washington and British Columbia.

Treasure of the Okanogan Highlands

During the Eocene, this large upland area—7500 feet above the palm-lined shores of the Pacific—hosted a wide array of plants not closely related to the subtropical and temperate plants we find in the floras of Southeastern Asia or southeastern North America today. Among the highest land-masses on the planet at the time, this area (along with others like it around the globe) is thought to be one of the birthplaces of today's Northern Hemisphere temperate forests.

From the middle of the Eocene onward, the climate became cooler and drier, and broad-leaved evergreens began to disappear, allowing broad-leaved deciduous plants to flourish. Maples and the rose family, which were minor players in the subtropical forests, had a major evolutionary burst in the highland forests—a burst that supplied the genetic diversity for



continuing evolution in these two major groups of modern plants.

These ancient floras were not really analogous to anything we see today, even in parts of the world that have many modern representatives of the genera found in fossils there. Oaks, beeches and rhododendrons are seldom found. And extinct genera with confounding names like *Macginitiea*, *Plafkeria* and *Barghoornia* were plentiful. Still, these floras represent a very early and crucial stage in the evolution of the modern temperate forest, according to Wesley Conrad Wehr.

Wes Wehr (1929–2004), a Seattle artist and musician, and “a foot soldier of paleobotany,” as

ABOVE: Amateur paleobotanists digging for fossils at the Boot Hill site, in Republic.



he described himself, was integral to the understanding of this flora. In 1977, Wehr—already an affiliate curator of paleobotany at the Burke Museum—set out with his teenage companion and driver, Kirk Johnson, for the Okanogan to dig fossils. Their destination was the town of Republic, Washington. The site of gold mining since 1896, the area had yielded fossils as early as 1910, cast-offs of the mining industry. In 1946, the Smithsonian had sent a group of paleobotanists to Republic, but after finding only 15 species, they decided there was nothing worthwhile there and left.

ABOVE TOP: *Metasequoia occidentalis*, a now-extinct species of dawn redwood. Leaves of this redwood are among the most-common fossil types found at Republic, indicating that the species was abundant in the Eocene forest at Republic.

ABOVE BOTTOM: The extinct sycamore relative, *Macginitiea gracilis*.

Yet Wehr and Johnson's first visit offered plenty to get excited about. Johnson, who is now Director of the Smithsonian National Museum of Natural History, recalls, "We knew we were onto something big." But it wasn't until the mid-1980s that the most-productive outcrop, an ancient lake bed known as the Boot Hill site, was discovered. According to George Mustoe, a retired paleobotanist from Western Washington University, "Wehr quickly recognized the world-class importance of the site, and he began a highly successful effort to recruit paleontologists to conduct research at Republic."

By the 1990s Johnson was declaring, "Republic is the richest known Eocene floral locality in western North America." What makes this ancient flora so rich, according to Johnson, is that it represents a period when the planet was just beginning to cool after reaching a global thermal maximum. Also the mid-level elevation allowed for genera from both higher and lower elevations to be present.

Familiar Fruits of an Ancient Eden

No palms have been found in Republic, yet cycads have, probably having existed in a micro-climate situation. There is also an abundance of relict taxa from the Cretaceous period, like *Metasequoia*, *Cercidiphyllum* and *Ginkgo*, and members of the Betulaceae (birches), Ulmaceae (elms) and Fagaceae (oaks), which had diversified tens of millions of years earlier. Most significant are the numerous early members of the rose family.

Wehr called the Eocene forests of the Okanogan Highlands "orchards" and "gardens"—and with good reason. They contain the



TOP: *Florissantia quilchenensis*, the extinct “stone rose,” actually a member of the Malvaceae, or mallow family, and a close relative of cacao.

BOTTOM: *Ginkgo biloba* from Republic, circa 49 million years old.

world's oldest fossil records of some of Washington's economic staples: apple (*Malus*), cherry (*Prunus*) and raspberry (*Rubus*). Also the oldest-known fossil records of currants (*Ribes*), mulberries (*Morus*), elderberry (*Sambucus*) and serviceberries (*Amelanchier*) were found at these sites, supporting Wehr's horticultural assessment of this Edenic flora.

It must have been a beautiful place.

The fossils themselves are beautiful. You can see how an artist like Wehr might have been attracted to them in the first place. The delicate and near-perfect condition of some of the fossils

belie the rough geologic and climatic processes that created them. They appear as though they had been laid by gentle hands between the pages of a sacred book.

How the Plant Fossils Formed

It took around 80,000 years for the 80-foot-deep fossil beds at Republic to form. This occurred during a relatively calm geological cycle, with few or no volcanic eruptions in the vicinity. A deep, nine-square-mile lake developed at the Republic site during the late-middle Eocene. It was part of a chain of lakes running north to south from present-day British Columbia into Washington. Seasonal rains washed fine-grained, ash-rich soils and plant debris—seeds, flowers, leaves and twigs—from the surrounding volcanic mountains into the lake. Even animals—insects, fish, and at least one bird—were trapped in the soils at the bottom of the lake.

Because the soils were anaerobic, decomposition could not take place, and the organisms were preserved. In later epochs, heavy volcanic activity formed a basalt layer over these soils, protecting and compressing the fossilized specimens in a shale-like mudstone. Later uplifting pushed them back to the surface again.

When you split the soft mudstone and reveal a fossil, it is not a print of a leaf but a carbon shadow of a leaf nearly 50 million years old. Like a charcoal sketch, the leaf rests on the surface of the stone, fragile in the first light it has seen for eons. During the process of carbonization (a process similar to the formation of coal), venation and leaf margins, papery insect wings and fish scales are preserved. This makes these fossils not only beautiful to behold, but incredibly detailed specimens for study.

According to Wehr, by 1996 nearly 450 fossil taxa of plants had been recorded from the Okanogan Highlands sites in Washington and British Columbia. About 250 of those have been identified; the remaining 200 are likely to represent new genera. Many can be seen at the Burke Museum, the Princeton Museum in British Columbia, and the Stonerose Interpretive Center in Republic.

Dig for Fossils at Stonerose!

The Stonerose Center, which opened in 1989, was Wehr's brainchild. Wehr wanted to make the excitement of fossil digging available to all. So the Boot Hill site remains open to the public under the auspices of the Center. The dig site is within city limits—the City of Republic actually sits above the ancient lake—just blocks from the Stonerose Center.

Housed since 1996 in a historic home, the Center is part museum/part research facility and maintains a well-archived research collection. It is also the starting point for visitors coming to try their luck at fossil digging. Travis Wellman, Operations Manager at the Center, estimates between five and 10 thousand visitors come each year. Most, he says, are families with small children. But many paleobotanists arrive yearly, too—from the Burke, as well as Yale, Arizona State, and the Denver Museum of Natural History. And even as far afield as Russia!

Stonerose still reserves the right to withhold any rare specimens that visitors dig, but these specimens are labeled with the collector's name, and often these names are used in the naming

of new-found species. Wellman estimates that he retains two to five samples each week that visitors have dug. And each year they are adding one or two new species of plants or animals to the archive.

The landscape around Republic has a lovely old beauty, soft like the Ozarks. The conifer-covered knolls and dales and little lakes and rivers seem so gentle when compared to the geologic history of the place. It has sunk, over time, to only 2500 feet in elevation, and the climate is decidedly colder and drier than in the Eocene. There are no dawn redwoods, katsuras or ginkgos anymore.

But there are wild hawthorns and serviceberries, firs and pines in those hills. And in the town gardens there are roses and birches, apples and maples: all part of a very modern flora that started 50 million years ago. ~

DANIEL MOUNT is an estate gardener, garden writer, and member of the "Bulletin" Editorial Board. He lives on a small farm in the Snoqualmie Valley. Read more of his reflections on plants and gardening at www.mountgardens.com.

Interpreting the Stonerose Logo

The Stonerose Interpretive Center was named for the numerous unique early members of the rose family found at the fossil site in Republic, Washington. The beautiful plant that inspired the Stonerose logo, however, is not a rose at all or even in the rose family. It is an extinct species, *Florissantia quilchenensis*, a member of the Malvaceae, related to cocoa. The best-preserved specimens of *Florissantia* are found at the Republic site.



The Stonerose Interpretive Center is open from May through October. For a small fee, you can find your own fossils, maybe even a new species of plant or animal. Visit www.stonerosefossil.org for more information.



Hidden Treasures of the Arboretum Pleasing Polyspora

BY WALT BUBELIS

While strolling along the Lookout Loop Trail in June, close to where it intersects with the New Zealand Forest, I came across an attractive plant that I'd never noticed before. It was a small, erect, broadleaf tree, with long, glossy, serrated leaves, large camellia-like flower buds, and ripening fruits that looked for the world like enormous green acorns. Peeling, tan-colored bark also enhanced the display.

The plant didn't register with me, and the attached metal tag gave only an accession number



(135-99*A), which I noted down. Later, I consulted the Arboretum's online interactive map (<http://depts.washington.edu/uwbg/gardens/map.shtml>) and searched using the number. The website gave me a name that I didn't recognize: *Polyspora speciosa* (a synonym of *Polyspora kwangsiensis*).

Further research revealed the plant to be an evergreen member of the tea family (Theaceae) that grows wild in the forests of China and Vietnam and reaches 15 and 45 feet tall in its natural habitat. Closely related to *Camellia*,



ABOVE: The leaves, flower buds, and acorn-shaped fruit of *Polyspora speciosa*. (Photo by Niall Dunne)

OPPOSITE: *Polyspora speciosa* in bloom in the Arboretum in October. (Photo by Walt Bubelis)

Gordonia is one of many plant genera with disjunct distribution (where related species are widely separated geographically) between the eastern United States and China. In the southeastern U.S., we have *Gordonia lasianthus*, the loblolly bay. This plant grows up to 70 feet tall and is used for cabinet wood. Just one other species of *Gordonia* is found in the New World, namely *G. fruticosa*, of the tropical forests of Central and South America. (Some botanists include the Franklin tree, *Franklinia alatamaha*, formerly of Georgia—but now extinct in the wild—as *Gordonia*, but research indicates that this plant is more closely related to the Asian genus *Schima*.)

Polyspora species were originally thought to be members of the genus *Camellia*, but once seed pods are compared, you can see an obvious difference: *Polyspora* seed pods open to five valves, whereas there are just three in those of *Camellia*. Another key difference is in the shape of the seeds: *Polyspora* seeds have wings, while *Camellia* seeds don't.

The Arboretum Specimens

I asked Ray Larson, Curator of Living Collections at UW Botanic Gardens, about the history of the Arboretum's *Polyspora* specimens. He consulted the plant records and found that we procured eight cuttings of three species of *Polyspora* from Rancho del Descanso Nursery in La Cañada, California, in 1999. These cuttings were planted

Gordonia and *Franklinia*, the genus *Polyspora* contains about 40 species, all indigenous to East and Southeast Asia.

The Arboretum's digital map showed a specimen of another species, *Polyspora axillaris*, quite close to the *P. speciosa*. I returned to the site, and sure enough, *P. axillaris* was there, just slightly upslope and south of its cousin. Another attractive plant, native to China, it doesn't grow as tall as *P. speciosa* (about 20 feet at most) and produces mostly entire, obovate leaves (shaped like an egg, but with the wide end at the tip).

Family Ties

Both plants have had recent name changes, having resided in the genus *Gordonia*, among others. Within the last 15 years or so, the roughly 40 Asian species of *Gordonia* were transferred to the genus *Polyspora*.



LEFT: The foliage and flower buds of *Polyspora axillaris*. (Photo by Niall Dunne)



RIGHT: Fullmoon® *Polyspora* in bloom. (Photo courtesy Corinne Hollister)

out in the Arboretum in 2002, but only two survived—the *P. speciosa* and *P. axillaris* I found along the trail. A single specimen of another species, *P. chrysandra* was among the original batch, but it did not survive beyond the initial planting.

Polyspora axillaris is well established in cultivation, but our specimen doesn't appear to be doing so well, compared to the healthier-looking *P. speciosa*. Perhaps it's a hardiness issue, with *Polyspora speciosa* rated for the cooler USDA Zone 7b and *P. axillaris* hardy to Zone 8b. Available in nurseries from Dan Hinkley's Plant Collection at Monrovia is a cultivar of another species, *Polyspora longicarpa*, being sold as Fullmoon® *Polyspora* (*Polyspora longicarpa* 'MonSaPaRby' PPAF). This plant is rated for hardiness Zones 7 to 11 and grows up to 12 feet tall.

The Arboretum plants are getting direct sun for at least half the day, which seemed to be helping them set numerous flower buds, particularly in the case of *P. speciosa*. General growing recommendations for the genus seem to be the same as for camellias and loblolly bay. That is, partial shade to full sun in organically rich, slightly acidic, moist but well-draining soil. Growing the plant in partial shade will likely ensure more favorable moisture conditions but may also decrease flower bud set.

Gorgeous, Late-Season Flowers

If you're lucky enough to locate a nursery specimen of *Polyspora*, whatever the name, you'll undoubtedly enjoy the blossoms. Large, five-petaled white flowers appear in autumn, winter or early spring,

depending on the species. The resemblance to the single flower of species *Camellia*—with their multitude of yellow stamens in the center—is striking. A not-particularly-flattering common name for *P. axillaris* is the fried-egg plant. I suppose, from a distance, a *Polyspora* in peak bloom can look a little like it's covered in eggs, over easy.

I returned to the Arboretum's *Polyspora* specimens on a regular basis in the fall. In mid-October, *Polyspora speciosa* burst into bloom and flowered for about two weeks. As I write this, in late October, *P. axillaris* has yet to bloom. An article I found by Professor David Creech at SFA Mast Arboretum, in Nacogdoches, Texas, says that this species has a tendency to flower there in November or December. The bloom time for Fullmoon® *Polyspora* blooms is marketed as "winter or early spring."

Because of its handsome evergreen leaves and bark, *Polyspora* is a plant for any season. Use it as a focal point in a landscape large enough to accommodate the eventual growth. *Polyspora* also looks great in woodland settings with dappled light. Dan Hinkley also recommends Fullmoon® *Polyspora* for mass plantings to create a tall, natural background hedge or screen. If you don't have room for the plant in your own garden—and you need a good flower fix in the cool season—visit the Arboretum and track down our pleasing *Polyspora*. ~

WALT BABELIS is a Professor Emeritus in the Horticulture Department at Edmonds Community College. He is also a member of the "Bulletin" Editorial Board.

MsK Rare and Native Plant Nursery

The Lifelong Dream of Mareen Schultz Kruckeberg

BY JOHN A. WOTT



Mareen Schultz Kruckeberg was a major horticultural force in our region. Born Mareen Schultz in 1925, near Harrisburg, Pennsylvania, she moved to Washington State as a child. She developed an interest in nature at an early age, during trips she would take with her mother to such places as Mt. Rainier and Olympic Hot Springs.

ABOVE: Rhododendron blooming in the Upper Garden in spring. **INSET:** Mareen photographed in 1952, aged 27.
(Photos courtesy Kruckeberg Botanic Garden)



After graduating from West Seattle High School, Mareen headed to Alaska, where she worked for five years in an army base file room during World War II. During that time, she went on numerous hikes in the wilderness. On one of those hikes, a friend informed her about the Latin name of a handsome tree, which was an *Acer*, and Mareen caught the botany bug. Upon returning to Seattle, she entered the botany program at the University of Washington. She also started her life-long quest of growing the plants that she studied.

While attending her botany field trips, she met a widowed professor, Arthur Kruckeberg. They married in 1953 and set about caring for Arthur's three children, plus eventually two of their own. During this time, they lived at Arthur's Capitol Hill address.

Purchasing the Property

But the longing for a garden and more space resulted in their purchase (in partnership with Mareen's father, Arthur Schultz) in 1958 of a 3.86-acre stretch of hillside in Richmond Beach. The family lived in the main home, while grandfather occupied a small adjacent building (still standing), where he also built the children a large jungle gym, which became a neighborhood favorite.

Arthur and Mareen started planting immediately, first by bringing in trees from their Capitol Hill property. In order to expand the plant collection, Mareen studiously began to propagate plants from seeds and cuttings, and as success came, she started to sell the excess to friends and plant enthusiasts. The family would often go on picnics where they HAD to eat everything



youngest daughter. Horses were in the lower pasture, and the children rode them all over the neighborhood.

Mareen also loved dogs, and one puppy grew into a large animal with a hard-wagging tail. Once, says Enid, while Mareen was giving a garden tour, this dog started methodically “chopping off” the heads of flowering lilies with its tail. But Mareen was completely unperturbed. “That is all right,” she said. “They will grow back next year.” Similarly, dogs lying in a flower bed were not to be punished or disturbed: The plants would return!

Nursery Beginnings



From the very beginning, the MsK Rare Plant and Native Plant Nursery, and what is now called the Kruckeberg Botanic Garden, were intimately entwined. Certainly Mareen influenced the character of the garden because of the plants she selected to grow. Before a plant went into the ground, it met her requirements as to mature size. Arthur brought home UW Botany greenhouse-started seedlings and planted them in the lower meadow. In 2002, Mareen sawed them down because they were eventually going to get too big for the area.

Officially, Mareen began to sell plants in 1967, after requests from the many visitors who toured the grounds and then saw the excess of potted plants in the nursery. In 1970, the greenhouse was built. Learning that she couldn’t legally sell plants without a business license, Mareen obtained her nursery license in 1971 for \$1.00. Right from the beginning, she specialized in native plants that were rarely available elsewhere.

Mareen was a quiet, shy person. She did not like big-group tours and preferred one-on-one interactions instead. On one occasion, says Enid, Arthur invited an Arboretum Foundation unit to visit the garden, but Mareen canceled the tour when she learned about it, claiming there were too many weeds.

contained in their picnic baskets so they could fill them with plants, cuttings, seeds, rocks and other items to add to their growing garden.

Mareen loved animals. “Being able to watch all birds in the garden through her bedroom window was a must for her,” says Enid Kruckeberg Kriewald, Mareen and Arthur’s

ABOVE LEFT: The MsK Nursery, photographed in 2011. (Photo courtesy Kruckeberg Botanic Garden)

ABOVE INSET: Mareen and Art in the nursery in 2001. (Photo by Norm Plate)

Visiting the Nursery & Garden

The MsK Nursery and the Kruckeberg Botanic Garden are located at 20312 15th Avenue NW, in Shoreline, Washington. They are open to the public every Friday, Saturday and Sunday, from 10 a.m. to 5 p.m during the regular season (March to September), and from 10 a.m. to 3 p.m. during the cold season (November to February). Admission is free. For more information, visit www.kruckeberg.org or call 206-546-1281.

Branching Out

Mareen's curiosity for the rare and unusual led her to seek out plants from New Zealand and other regions with similar climates to the Pacific Northwest. By 1975, she was selling to arboreta and parks across the United States. She specialized in the more idiosyncratic sides of horticulture. Her endeavors not only included Pacific Northwest natives, many ferns, and plants from New Zealand, but also container gardens set in limestone, tufa beds, cement, and homemade wooden troughs.

In 1987, she held her first Mother's Day Weekend sale, which quickly became a favorite of plant enthusiasts. It is still a major event for the Kruckeberg Botanic Garden. The funds from the sales were Mareen's "play money," which she used to generously provide for her children and fund trips abroad. The sales specialized in shade-tolerant plants, oaks, exotic broad-leaved trees, exotic conifers, ground covers, and plants for bonsai or container gardens.

Many of the nursery plants were propagules taken as seed or cuttings from plants already growing on the grounds. However, Mareen also collected seed on hiking trips and was often

the recipient of seeds gathered by other plant enthusiasts.

Mareen also was well known for her detailed and botanically precise, hand-drawn ads, which often accompanied Arthur's articles in the "Arboretum Bulletin" in the 1970s and early 1980s. Her illustrations were unique in their detail and much sought after. Her daughter Enid proudly shares them. Articles about the nursery and its plants, including writing by both Mareen and Arthur, were regularly found in all of the Northwest horticulture periodicals.

Family Matters

Arthur hated to see trees pruned. He said, "They need to grow into their natural state." So Mareen would wait until Arthur had left to teach class at the University of Washington or to take a trip to do her pruning. Once, recalls Enid, Arthur came home unexpectedly and found Mareen's trimmings. After that, Arthur would only ever find a pile of wood chips on the ground by the time he got home.

Enid remembers Easter as one of her favorite holidays growing up at the Kruckeberg Botanic Garden. Neighbors and family members would convene at the garden for an egg hunt and brunch, complete with one of their neighbor's famous lamb-shaped Easter cakes, adorned with flowers. After Mareen hid the eggs for the group, she and Enid would also hide eggs for each other so they could both join in the fun of the hunt. The Easter egg-hunt tradition continues today in the public garden.

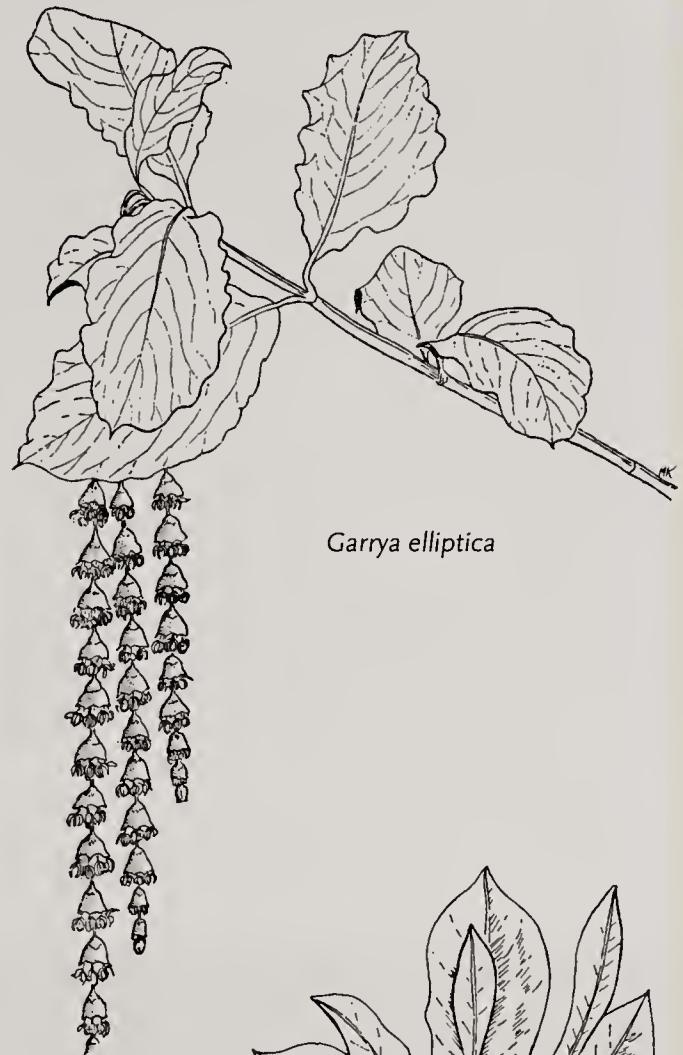
The Garden still follows Mareen's guidelines of not using commercial fertilizer or pesticides. Mareen would collect eggshells for months to enrich the soil. She purchased oyster shells for calcium. The Kruckebergs were the only family

New Zealand Forest
Landscape Architecture 206.325.6877
Urban Design bergerpartnership.com

The Botanical Drawings of MsK

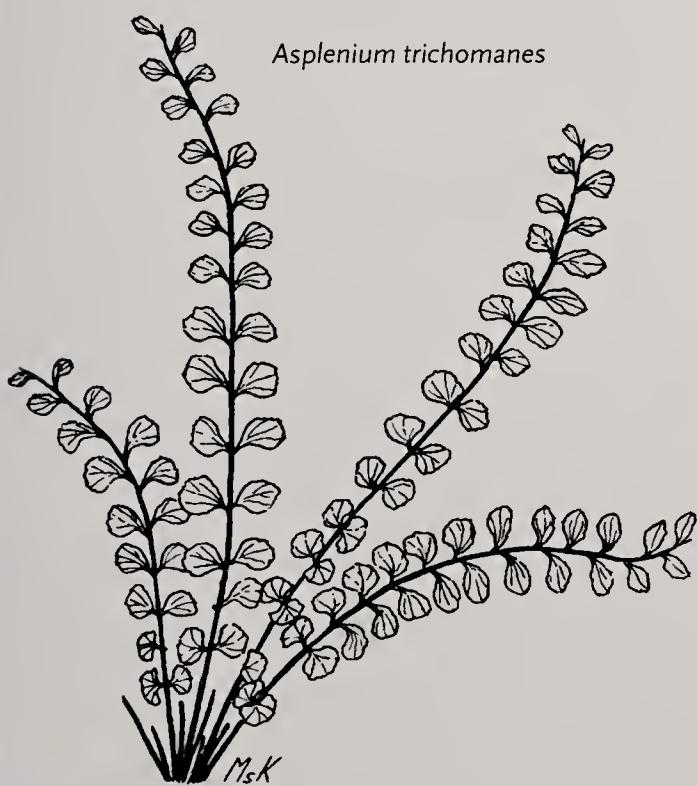


Sequoia sempervirens



Garrya elliptica

In addition to being a pioneer in the fields of horticulture and native plant propagation, Mareen Schultz Kruckeberg was an accomplished botanical artist. Her drawings appeared in the pages of this magazine, as well as in advertising for the nursery. Here are four samples of her work, selected for this issue by Cynthia Welte, a former development officer at the Arboretum Foundation and now the Kruckeberg Botanic Garden's new executive director.



Asplenium trichomanes



Arctostaphylos columbiana

for blocks for whom the mailman delivered boxes of ladybugs or praying mantis, which were used for natural pest control.

A Growing Legacy

Mareen passed away in January 2003, but her botanical legacy continues to flower and bear fruit. The nursery was Mareen's business: She founded it, gave it its scope and style, managed its affairs, and looked to its future. Arthur was an active contributor to the nursery, particularly of propagated material.

The nursery has always enjoyed a symbiotic relationship with the garden, not just in terms of plant material, but also public attention and promotion. For instance, people visiting the nursery have always been free to tour the garden, where they could see the mature forms of the plants, and then they could return to the nursery to purchase them.

In 2008, the City of Shoreline purchased the garden so that it could be preserved for

and enjoyed by the public. The non-profit Kruckeberg Botanic Garden Foundation now operates both the garden and the nursery, and proceeds from the nursery help fund the day-to-day maintenance of the garden and its 2000-plus species of native and exotic plants.

The botanical garden has become one of our region's environmental gems. Arthur Kruckeberg still thrives, at age 95, in the home in the garden.

It has been stated, "Today, the strength of the Kruckeberg Botanic Garden lies in the plants that are in the ground and the large assortment of nursery plants. It also lies in the traditions established by Mareen and Arthur, which include an awareness, appreciation, and exploitation of the land's dynamic history that will keep this collection beautiful, unique, and vital for the next generations." I couldn't agree more. ~

JOHN WOTT is the director emeritus of Washington Park Arboretum and a member of the "Bulletin" Editorial Board.

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Wind-Resistant Trees

BY NIALL DUNNE

A key message in my article in the fall issue of the "Bulletin" was that trees used to shade and screen your home can significantly lower your energy use and climate footprint. I originally planned to follow up this article with another recommending good species for shading and screening in our region, but a strong wind-storm in late August that felled a lot of trees and branches in our region changed my mind.

As the fall article discussed, climate change will not only bring us hotter summers and wetter winters, but also more frequent and powerful storms. If the August storm was a taste of what's to come, it could be a challenge to get some people to retain any trees in their gardens, let alone plant new ones. "Trees failing in wind are a huge concern," says arborist Christina Pfeiffer. "Sadly, we often see people removing good trees in reaction to these storms."

Arboretum Storm and Wind Adaptation

Shortly after the August storm, Arboretum horticulturist Roy Farrow posted a fascinating short

piece on the UW Botanic Gardens website looking at how different trees species in the Arboretum fared in the high winds. Western red cedar (*Thuja plicata*) performed very well, wrote Roy. "Cedar limbs are fibrous and tenaciously strong. Long, bendable limbs whip and swing in the wind, but rarely break. The wind's energy is transferred to the trunk, and the cedar relies on its massive girth and extensive root system to keep itself upright."

Douglas fir also fared well (*Pseudotsuga menziesii*), though it dropped a mess of small twigs. "The detritus lying on the ground provides ample evidence of how Doug fir defends itself against wind," said Roy. "The wood...is brittle and can snap. However, when a strong wind acts on the tree, it sacrifices small pieces of foliage to shed the wind's energy."

Black cottonwood (*Populus trichocarpa*) performed poorly in the wind, and that's because it sacrifices strength in its wood for speed of growth. "Just to the northwest of our Overlook Pond," wrote Roy, "a massive black cottonwood demonstrates how weak wood tends to shatter under stress."



Ginkgo biloba has a good reputation for wind resistance, owing to its adaptability, deep roots, strong wood, and small leaves. (Photo courtesy Jean Pol Grandmont/Wikimedia Commons)

Bigleaf maple (*Acer macrophyllum*) got a not-so-good review. Though a sturdy tree with strong wood, it is also heavy, doesn't readily shed its sizable leaves, and—if not pruned for good structure—can develop multiple large secondary trunks that predispose it to storm damage. “The massive, reaching branches can shatter mid-limb when wind pulls on the sail-like leaves,” wrote Roy. “A recent example is located at the east end of Loderi Valley just above Arboretum Drive. Many of our bigleaf maples are festooned with ‘storm stubs’.”

Willows (*Salix* species) also have poor resistance to high winds. “Because willows are adapted to wet bottomlands,” says Roy “their roots can be shallow mats that peel up with relative ease when a strong wind levers a tall tree.”

Lessons from Hurricane Land

Studies of post-hurricane survival rates of trees in the southeastern U.S. point to a number of key traits that make some species more wind-resistant than others. These include the ability to shed leaves during a storm. With this survival strategy, the metabolic cost of re-growing leaves is much lower than that of re-growing wood—or of keeling over dead. Crape myrtles (*Lagerstroemia indica*) and flowering dogwoods (*Cornus florida*) scored best for this strategy in the studies.

High elasticity of the wood and high “modulus of rupture” (basically, bending strength, or how much the wood can bend without breaking) were two other key survival traits. Southern live oak (*Quercus virginiana*), which is hardy in our region, scored highest for flexibility and bending strength. Tulip poplar (*Liriodendron tulipifera*), which is a popular street tree here, scored very low on bending strength.

Based on their studies and a review of the literature, the researchers developed a list of trees with high wind-resistance. The list includes plenty of species we grow here: bald cypress (*Taxodium distichum* var. *distichum*), southern magnolia (*Magnolia grandiflora*), Japanese maple (*Acer palmatum*), sweet gum (*Liquidambar styraciflua*), and river birch (*Betula nigra*), to name a handful.

Included on the low-wind resistance list were Bradford pear (*Pyrus calleryana*), Leyland cypress (*xCupressocyparis leylandii*), tulip poplar (*Liriodendron tulipifera*), hackberry (*Celtis occidentalis*), box elder (*Acer negundo*), and silver maple (*Acer saccharinum*).

For the complete lists, see “Wind and Trees: Lesson Learned from Hurricanes,” by Mary Duryea and Eliana Kampf (University of Florida, IFAS Extension), <http://edis.ifas.ufl.edu/pdffiles/FR/FR17300.pdf>.

The Problem with Lists

Of course, once people publish “best of” and “worst of” lists, other folks with different experiences start to disagree with them!

“I’ve always heard the bad things about tulip poplars,” says assistant manager of horticulture at the Arboretum Chris Watson. “Oddly enough, they have performed very well for us in the Arboretum. Little if any storm damage...definitely no major damage! Knock on wood, though! Some of the trees on the ‘high wind resistance’ list are surprising to me. Bald cypress and sweet gum are notorious for shedding medium-to-large branches in moderate winds in the Seattle area.”

Because trees species can behave differently when planted in different climates, it may be problematic to draw parallels between their performance during hurricanes in the Southeast and windstorms in the Northwest. And even in our region, experts may disagree about which species are more or less wind firm. Something all arborists would agree on, however, is that most healthy trees with good structure are less likely to cause serious problems during a windstorm. And on the flipside, any tree—no matter how naturally wind resistant—can become a hazard if it’s not properly cared for.

The Importance of Proper Tree Care

And this gels with what the hurricane researchers found out about other factors driving survival success. Diseased and decaying trees were more likely to fail during strong winds. Tree age was also a factor—as with people, older trees are stiffer and more liable to break. In addition, trees with poor

structure fared badly. Structural defects include co-dominant stems, in which two or more main stems of the same diameter emerge from the same point on a trunk, creating the potential for a weak attachment that's susceptible to breakage.

Other important factors in hurricane survival included not only root depth (trees with deeper roots fared better) but also soil depth (trees planted on sites with adequate space for roots to grow performed better). Soil structure and health were also important: trees planted in compacted, poorly draining soil, were less likely to withstand strong winds.

In conclusion, though some trees are better at withstanding wind than others, our main focus should be on practicing good tree stewardship. Homeowners need to look at their trees for health and structure issues, especially as the trees age, or if the species has known issues. Bigleaf maple, for example, is frequently removed in urban areas due to its structural issues and size; yet individual specimens with good structure and health that merit keeping are also found. If in doubt, an assessment by an ISA Certified Arborist can help.

When planting any new tree, make sure you install it in a spot with suitable growing conditions for that species; provide it with adequate root and aboveground space; and water it regularly until it's established. Protect the soil around the tree with regular applications of organic mulch. Loose staking of trees in their first year of growth can help them develop a strong, central leader and good taper (where the trunk gradually narrows towards the tip), which help make them more wind firm.

If the tree is in a high-use area, such as next to a house or path, have an arborist train it for good structure and attractive form. (This applies particularly to trees with rounded, spreading canopies, such as maples, oaks and ashes; trees with conical forms, such as most conifers, don't require the same level of pruning.) Proper pruning from a young age is the best way to ensure that trees don't develop structural defects such as co-dominant stems, overly dense canopies, and weak branch attachments. As your tree reaches maturity, have a consulting arborist evaluate it

every couple of years or so.

Don't ever top a tree, because topping cuts can produce weakly attached regrowth and columns of decay inside the large branches below the cuts. Topping also can adversely affect a tree's structure and roots, making it more susceptible to wind failure.

One more tip: When planting in an open spot, plant more than one specimen—if there's enough space—so that it doesn't have to bear the full brunt of the wind by itself. Trees perform better in high winds when they are grown in clumps, compared to when planted alone. ~

NIALL DUNNE is the editor of the "Bulletin."

A poem inspired by frost flowers:

Summoning the Names

he was the author of a torch lily monograph
and given to brandishing the many-colored jacket
like a pennant:

behold a perennial circus of tall-stalked tent poles
balancing the shifting weight
of the sky's cloudy baggage
he had a wing-word for everything
a windy syncopation of syllables
ruffling their feathers for flight

and what of me and my taproot etymologies
earth's own ink-black beetle
scumbling a tilthy script
beneath the feet of giants
I'm left-handed in the wrong language
erasing my words as I go
a buried lexicon beneath the mulch of leaves
one long ghostly in-held breath that heats the soil
and waits its chance

the frozen air goes quiet
the carnival of color's calmed to brown
and I call you up through wintry stems
tunnel through the xylem rays—frill and unfurl
you words, you glittering petals of ice
no one's here to see you let alone
debate your essence
you don't clamor for an audience but dissolve
like the wisp of a brilliant thought that slipped the net

—Rebecca Alexander



Q&A from the Miller Library's Plant Answer Line

Frost Flowers: A Cold-Weather Curiosity

BY REBECCA ALEXANDER

This regular column features Q&A selected and adapted from the Elisabeth C. Miller Library's Plant Answer Line program. If you'd like to ask a plant or gardening question of your own, please call (206) 897-5268 (UW Plant), send it via the library website (www.millerlibrary.org), or email directly to hortlib@uw.edu.

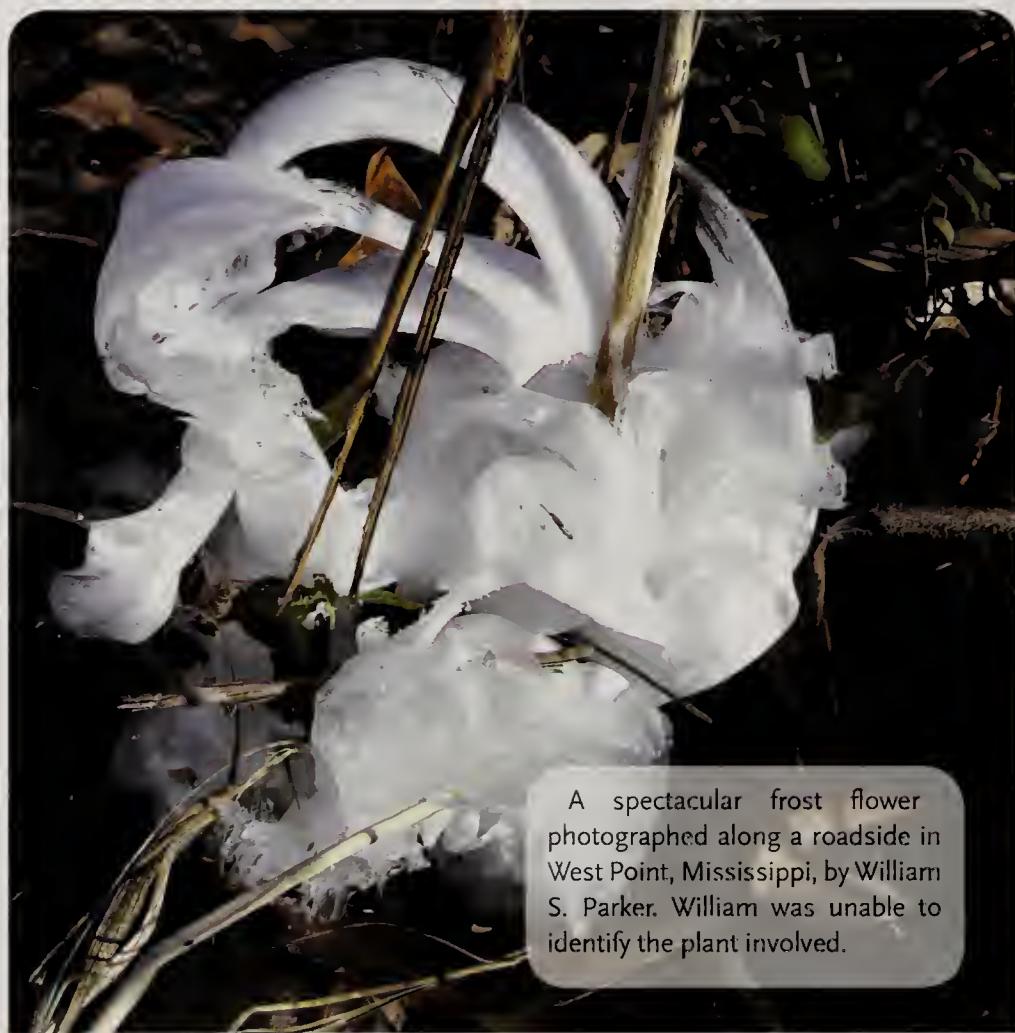
QUESTION: Last winter, I was walking past a neighbor's garden and noticed a few dried stalks (not sure what the plant was) that were sprouting a candy floss-like substance. When I got down close, I could see it was ice coming out of cracks in the stems. What causes this phenomenon? Does it happen to only certain types of plants?

ANSWER: You were fortunate enough to witness an example of frost flowers (also called ice

flowers) or crystallofolia—a term coined by Bob Harms of the University of Texas, Austin, to distinguish the phenomenon from nature's other "frost flowers," which are a kind of branching sea ice. Relatively few plants exhibit these fanciful, ribbon-like, icy excrescences, and no clear pattern dictates which plant families or genera are likely to produce them.

Sometimes a plant's common name will hint at its frost-flowering potential. For instance, *Verbesina virginica*, native to most of the central and southern reaches of the eastern United States, is known by the names frost-weed and white crownbeard; the Eastern U.S. plant *Helianthemum canadense* is sometimes called rock frost or frostwort. Other plants known to indulge in crystallofolia include frost mint (*Cunila origanoides*), another Eastern U.S. native; and *Isodon rubescens*, a Chinese shrub with the common name of winter-ice herb.

In a column called "The Buzz," Memphis Botanic Garden's website explains the formation of frost flowers as follows: "When the ground is warm enough for the plants' roots to still be active, but the air temperature drops below



freezing [...] juices from the plant are expelled through slits in the stems [...] This may happen multiple times over the winter since our ground rarely freezes far down, but once the moisture is gone, so are the frost flowers."

The theories and explanations of why certain plants do this are far more complex. It may have to do with the xylem rays that carry sap from the center to the periphery of the stems, according to James R. Carter of Illinois State University. Plants with prominent rays appear more likely to produce ice flowers.

If you would like to increase the odds of witnessing these fascinating ice formations again in your own garden, you could try growing some of the plants on Carter's list (avoiding any which are invasive in our area!): <http://my.ilstu.edu/~jrcarter/ice/diurnal/stems/>

Here are a few to try:

Anemone halleri

Ceratostigma willmottianum

Echinacea species

Eupatorium cannabinum

Helleborus argutifolius

Origanum vulgare

Plumbago auriculata

Salvia coccinea

To this list, I would add *Monarda didyma*, the only plant on which I have ever seen frost flowers in Seattle. ☺

Bibliography

Carter, James R. "Flowers and ribbons of ice." "American Scientist," September/October 2013. Accessed online 8/6/2015: <http://www.americanscientist.org/issues/feature/2013/5/flowers-and-ribbons-of-ice/99999>.

Carter, James R. "My world of ice." Accessed online 8/6/2015: <http://my.ilstu.edu/~jrcarter/ice/>.

Harms, Bob. Crystallofolia (part of the University of Texas Plant Resources Center—Flora of Texas website). Accessed online 8/6/2015: <http://w3.biosci.utexas.edu/prc/VEVI3/crystallofolia.html>.

Means, Bruce. "Mysterious ice 'flowers.'" "The American Gardener," January/February 2005, pp.34–37.

Memphis Botanic Garden—"The Buzz" column from December 18, 2013. Accessed online 8/2015: <http://www.memphisbotanicgarden.com/buzz/posts/winter-solstice-frost-flowers>.

REBECCA ALEXANDER is the Plant Answer Line librarian at the Miller Library, located in the UW Botanic Gardens' Center for Urban Horticulture (3501 NE 41st Street, Seattle). She is also a contributing editor to the "Bulletin."

Historical Observation of Frost Flowers

In his webpage dedicated to every aspect of crystallofolia, Bob Harms of the University of Texas delves into 19th century documentation of the phenomenon. The first reported sighting was by Amos Eaton in his book, "A Manual of Botany for the Northern and Middle States," 2nd edition (1818). He reported seeing *Cistus canadensis* (now *Helianthemum canadense*) in November and December of 1816 on a barren plain at the base of Pine Rock in New Haven: "I saw hundreds of these plants sending out broad, thin, curved ice crystals about an inch in breadth from near the roots. These were melted away by day, and renewed every morning for more than 20 days in succession."

The British scientist Sir John Herschel, in his "Notice of a remarkable Deposition of Ice round the decaying Stems of Vegetables during Frost" ["London and Edinburgh Philosophical Magazine," 3d series, volume 2, pp. 110–111, January 12, 1833] made finely detailed illustrations of thistle (*Carduus* species) and heliotrope (*Heliotropium* species) and observed that the frost flowers tended to occur close to the roots, not on the upper parts of the stalks. "The point of the attachment of the ice was, however, always on the surface of the wood, beneath the outer bark or epidermis, which the frozen sheets had in every instance stripped off, and forced out to a distance." He speculated that the source of the phenomenon might be "in the plant itself, or in the comparatively warm earth beneath, to whose exhalations the decaying stems may form a kind of chimney."

The Flora of Oregon and Northern California

BY BRIAN R. THOMPSON

Roy Lancaster, the well-known British gardener, writer and speaker, visited the Miller Library in 2009. He was keen to know more about the plants of the Siskiyou Mountains in Southern Oregon and Northern California. Unfortunately, we had very little in the collection to help him at that time. For various reasons (see box on page 28), this plant-rich region has not been well presented in the older floras and field guides.

Times have changed for the better! We now have an excellent collection of books on this region--everything from wildflower field guides, to the best hiking options to see native plants, to a new flora of Oregon. These will benefit not only those planning to travel to the area, but also visitors to the Cascadia Forest in the Pacific Connections Garden of the Arboretum, which focuses on the plants of these mountains.

Wildflowers and Hikes

“Wildflowers of Southern Oregon” was written by John Kemper, a natural history writer who settled in Medford, Oregon and recognized the need for a simple guide to the native and naturalized flowers of the region. He’s also a skilled photographer, and even though each entry has only a single image, this will work well for most readers. Plants are divided by flower color, and by families within colors.

In the forward, Frank Lane, retired chairman of the Biology Department at Southern Oregon University in Ashland, writes that until this book was written, “there was no book for beginners covering all of Southern Oregon.” The author



Wildflowers
of Southern Oregon
A Field Guide
by John Kemper
With a Foreword by Dr. Frank Lane

includes a short list of best hikes, and—to help with planning—each image includes a description of the location and time of year when the photograph was taken.

A good companion would be “Oregon’s Best Wildflower Hikes: Southwest Region” by Elizabeth L. Horn. The author of three more conventional field guides to wildflowers, Horn makes this book about hikes to see wildflowers. Throughout, she uses only common names—best to keep the Kemper book handy—but this helps move you along the trail.

“Both Table Rocks are known for their colorful displays of springtime wildflowers,” she writes about two famed cliff-edged mesas (small, flat-topped hills) near Medford. “We hiked the area in both early April and early May and found the wildflowers breathtaking.” Lest this sound a little too idyllic, she warns that the trail rating is “strenuous” and notes, “... poison oak and ticks are plentiful, so stay on the trail.”

While Horn’s book is not a field guide, it does highlight many prominent plant species with close-up photos (all by the author) and enough interesting facts to make each profile distinctive. Detailed directions and GPS coordinates are provided to help you find each trailhead, while close-up maps help guide you along the trails.

If you enjoyed your hike up one of the Table Rocks, you might be interested in “Flowers of the Table Rocks,” by Susan K. MacKinnon. Upper and Lower Table Rocks, in the Rogue River Valley just north of Medford, likely are the remnants of a seven-million-year-old lava flow. Erosion left two mesas standing well above the surrounding valley, and their mostly open and grassy tops are home to over 300 plant species, including 200 wildflowers.

This self-published book primarily speaks through its numerous close-up photos. While

there's enough descriptive detail to engage the serious field botanist, the subject matter is presented in a way that's engaging even to those who might just want to know the names of the flowers. "I hope that some of the photos will inspire in even the casual reader the sense of awe, excitement and discovery that I experienced in studying the flowers," writes MacKinnon.

Much of the text discusses recent changes in nomenclature, and a table in the appendices records these changes. Other tables show times of flowering, common names, and—perhaps the most interesting—the meaning or source of the scientific names.

Conifers

Michael Edward Kauffman presents an excellent introduction to the ecology and the geology of the Klamath Mountain region (which includes the Siskiyous) in his book "Conifer Country." He also helped me understand the names of the mountains. The Klamath Mountains include nine distinct sub-ranges, beginning in the north with the Umpqua Valley of Oregon and reaching south to the Yolla Bolly Mountains west of Red Bluff, California.

The Siskiyou Mountains sub-range is by far the biggest, and includes all of the Oregon portion of the Klamath Mountains and a sizable part of the California portion, especially the area closer to the coast. But to complicate matters, the coast has its own, separate mountains (the North Coast Range).

Confused? The maps that Kauffman has drawn for his book will help tremendously. The main takeaway is that this is an extremely rich area for botanists. "The Klamath-Siskiyou Ecoregion is world-renowned for being a cross-roads for biodiversity, representing one of the most species-rich temperate coniferous forests on Earth."



Following an engaging introduction, the author profiles the 35 conifer species of this region, using excellent range maps and photos, as well as accessible text that will help even amateurs to tell these often-similar trees apart. The profiles are followed by a series of suggested hikes, all to areas of high conifer diversity, the richest being the so-called Miracle Mile. This square mile near Little Duck Lake, about 50 miles west of Mount Shasta, has over 400 vascular plant species, including 18 different conifer species!

Northern California

Mount Shasta itself has an interesting flora, and also has one of the most interesting field guides to that flora. "Mount Shasta Wildflowers" uses the watercolor paintings of Edward Stuhl (1887–1984) for its images. Stuhl was born in Budapest and studied art in Austria and Germany before coming to the United States to work in stained glass. He quickly left that pursuit and ended up in Northern

California, where he spent the rest of his long life painting the native flowers that he grew to love.

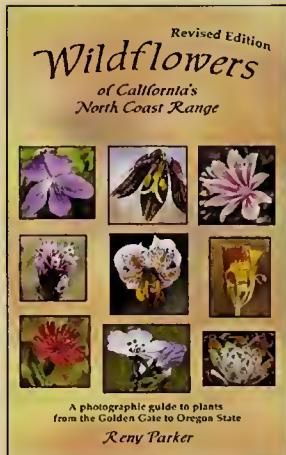
Four authors combined forces to bring this book into being—primarily, it seems, with intent of making the Stuhl art collection, housed at California State University Chico, better known. They also have spent considerable effort making this a worthy field guide by ensuring the taxonomy is up to date, providing a comprehensive and updated plant list for Mount Shasta, and giving guidance—through a series of recommended hikes—to finding each of the subjects.

A detailed visual index, with roughly inch-square reductions of the images arranged by colors, is a charming tool for helping you find your way through the book, but my favorite feature is the illustrated glossary, with its examples of numerous flower and leaf parts all taken from Stuhl's paintings.

Continuing Down the Coast

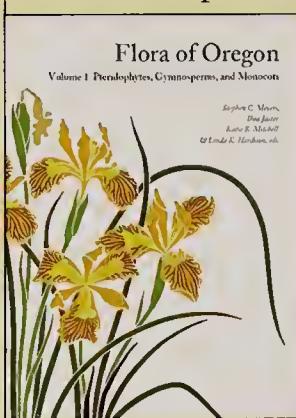
In defining the “Pacific Northwest” for the purposes of collecting books for the Miller Library, we include the portion of California north of the San Francisco Bay area. That inclusion was confirmed for me when visiting Mendocino County this past summer, where I especially enjoyed the Mendocino Coast Botanical Garden, with its closed-cone pine forest and arboretum of conifers.

A new book in the Miller Library collection, “*Wildflowers of Northern California’s Wine Country & North Coast Ranges*,” highlights the herbaceous natives of this area. And while the book’s reach does not extend north to the Siskiyous, it does fill in another gap in the field guides to our defined region.



Author Reny Parker has solid Northwest credentials, having learned to love the outdoors from outings with her father in central Oregon and British Columbia. She is primarily a photographer, and this book includes an elegant collection of close-up photos, arranged by colors and ordered so that species that resemble each other are together for easy comparison. At the end, there is a section for ferns, grasses and woody plants and maps of “Hot Spots for Wildflowers.” Since this book includes Marin, Napa and Sonoma counties, it would be

the perfect companion for a winery tour, giving you a chance to clear your head between tastings.



“*Flora of Oregon*”

The first comprehensive flora of the state of Oregon in over 50 years is being

Border Quandaries



Photo by jsayre64/Wikimedia Commons

direction, “*Vascular Plants of the Pacific Northwest*,” probably best known simply as “Hitchcock,” does not include the Siskiyous at all. The same is true of the popular “*Plants of the Pacific Northwest Coast*” by Pojar and others.

Eugene Kozloff’s “*Plants of Western Oregon, Washington & British Columbia*” (2005) does include the Oregon portion of this region, but it took Mark Turner and Phyllis Gustafson in 2006 with “*Wildflowers of the Pacific Northwest*” to cross the state line and include Northern California.

Turner used the same boundaries when he again was the lead author in the 2014 publication “*Trees & Shrubs of the Pacific Northwest*,” reviewed in the Fall 2014 issue of the “*Bulletin*.” If Roy Lancaster visited the Miller Library today, there would be so much more we could show him!

If the border between Oregon and California were based on ecosystems, it would not run through the middle of the Siskiyou Mountains. For most geobotanists, these mountains fall entirely within the California Floristic Province. Unfortunately, the state’s boundary has affected many of the floras, field guides and other publications that could have provided a unified botanical picture of this region.

For example, “*The Jepson Manual*,” an excellent flora of the state of California, stops at that state’s northern border. From the other

published, and this summer saw the release of part one of a planned three-volume set. Volume one is focused on ferns and their kin, conifers, and monocots, but in addition to the expected and detailed plant descriptions and range maps, there is an excellent general introduction to the wide diversity of ecosystems in this state, including the Siskiyou Mountains, an area rich in rare endemic species. “Rare plants in the region are concentrated on serpentinite and dunite and soils derived from these heavy-metal rich rocks,” writes Dennis A. Albert, in an introductory chapter. “Many of these plants are narrow endemics of only southwestern Oregon, but several have ranges that extend into adjacent northwestern California.”

Taking a cue from field guides, “Flora of Oregon” includes a list of recommended places throughout the state to see the greatest number of plant species. Highlights in the Siskiyou Mountains ecoregion include the already familiar Table Rocks (although beware, there are geographical features elsewhere in Oregon that also go by this name), the trail through the Rogue River Canyon downstream from Grants Pass, and the Mt. Ashland–Siskiyou Peak ridge, “home to a unique flora that is transitional between California and Oregon floras.”

If you’d prefer to explore nature from the comfort of your couch (or one of the comfortable chairs in the Miller Library), you might vicariously go botanizing by reading the biographies of a dozen or so prominent Oregon botanists included in the introduction. I found the story of Lilla Leach (1886–1980) most interesting, especially her discovery of the Siskiyou Mountains endemic and monotypic genus *Kalmiopsis leachiana*.

In 1930 Leach was walking ahead of her husband, John Leach, (who was also an active field botanist) and their pack burros, when, she says, “...suddenly I beheld a small patch of beautiful, low growing, deep rose-colored plants. Because of their beauty, I started running and dropped to my knees.” May we all have such exciting moments when exploring for our native plants! ~

BRIAN R. THOMPSON is the manager and curator of the Elisabeth C. Miller Library of the University of Washington Botanic Gardens. He is also a member of the “Bulletin” Editorial Board.

Bibliography

Reviewed

Cohn, Jane, Linda Freeman, Ken Goehring, and Michael Zanger. “Mount Shasta Wildflowers: A Field Guide Featuring the Paintings of Edward Stuhl.” Mt. Shasta, CA: Wise Women Ink, 2015. ISBN: 978-0-9762008-5-7, \$24.95.

Horn, Elizabeth L. “Oregon’s Best Wildflower Hikes: Southwest Region.” Englewood, CO: Westcliffe Publishers, 2006. ISBN: 978-1-56579-533-4, \$19.95.

Kauffmann, Michael Edward. “Conifer Country: A Natural History and Hiking Guide to 35 Conifers of the Klamath Mountain Region.” Kneeland, CA: Backcountry Press, 2012. ISBN: 978-0-578-09416-8, \$24.95.

Kemper, John. “Wildflowers of Southern Oregon: A Field Guide.” Ashland, OR: The Nature Shop, 2006. ISBN: 0-9722509-6-4, \$21.95.

MacKinnon, Susan K. “Flowers of the Table Rocks, 2nd edition.” Medford, OR: S. K. MacKinnon, c2007, 2014. ISBN: 978-0-9814590-1-1, \$36.95.

Meyers, Stephen C., Thea Jaster, Katie E. Mitchell, and Linda K. Hardison, editors. “Flora of Oregon, Volume 1: Pteridophytes, Gymnosperms, and Monocots.” Fort Worth, TX: Botanical Research Institute of Texas, 2015. ISBN: 978-1-889878-46-1, \$75.00.

Parker, Reny. “Wildflowers of Northern California’s Wine Country & North Coast Ranges: A Photographic Guide to Native Plants of Marin, Sonoma, Napa & Mendocino Counties.” Cloverdale, CA: New Creek Ranch Press, 2007. ISBN: 978-0-9790430-0-0, \$24.95.

Referenced

Baldwin, Bruce G., Douglas H. Goldman, David J. Keil, Robert Patterson, Thomas J. Rosatti, and Dieter H. Wilken, editors. “The Jepson Manual: Vascular Plants of California, 2nd edition.” Berkeley, CA: University of California Press, 2012. ISBN: 978-0-520-25312-4, \$131.95.

Hitchcock, C. Leo, Arthur Cronquist, Marion Ownbey, and J. W. Thompson. “Vascular Plants of the Pacific Northwest, in Five Parts.” Seattle: University of Washington Press, 1955–1969.

Kozloff, Eugene N. “Plants of Western Oregon, Washington & British Columbia.” Portland, OR: Timber Press, 2005. ISBN: 0-88192-724-4, \$65.00.

Pojar, Jim and Andy MacKinnon, editors. “Revised Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia, & Alaska.” Vancouver, BC: Lone Pine Press, 2004. ISBN: 978-1-55105-530-5, \$24.95.

Turner, Mark and Phyllis Gustafson. “Wildflowers of the Pacific Northwest.” Portland, OR: Timber Press, 2006. ISBN: 978-0-88192-745-0, \$27.95.

Turner, Mark and Ellen Kuhlmann. “Trees & Shrubs of the Pacific Northwest.” Portland, OR: Timber Press, 2014. ISBN: 978-1-60469-263-1, \$27.95.



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